

REMARKS

In light of the foregoing Amendments and following Remarks, reconsideration and allowance of the above-captioned application are respectfully requested.

Claims 1-37 are currently pending in the application, including independent claims 1, 15, 22, and 30. For instance, pending claim 1 is directed to a process for forming a nanostructure. The process includes providing a metal to a reaction chamber and heating the reaction chamber to a reaction temperature such that the metal becomes molten. In particular, the reaction temperature in the process of claim 1 will be at least 650°C (support for this claim limitation can be found in the application as filed at Table 1). The process also includes flowing a vapor stream comprising a reactant through the reaction chamber, reacting the reactant with the metal via a thermal CVD process to form a reaction product, and forming a nanowire or a nanobelt that includes this reaction product.

In the Office Action, claims 1-10 were rejected under 35 U.S.C. §102(e) as being anticipated by Sharma, et al. (U.S. Patent Application Publication 2003/0039602).

Sharma, et al. discloses a synthesis technique for growing semiconductor nanowires at temperatures less than 500°C (paragraph [0004]). In addition, the methods of Sharma, et al. synthesize the semiconductor fibers in a low pressure chamber at a vacuum from 100 mTorr to one atmosphere (paragraph [0009]). In particular, the synthesis route of Sharma, et al. is disclosed at temperatures “well under 550°C, preferably less than 300°C” (paragraph [0049]).

The processes of pending claims 1-10, in contrast, take place at higher temperatures than those disclosed by Sharma, et al. In particular, the processes of the presently presented claims 1-10 are carried out at a temperature of at least 650°C. Accordingly, Applicants respectfully submit that for at least this reason, presently pending claims 1-10 patentably define over Sharma, et al.

In the Office Action, claims 11-45 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sharma, et al. in view of Majumdar, et al. (U.S. Patent Application Publication 2002/0172820).

Applicants respectfully submit that the presently pending claims patentably define over the cited references for at least the reason that the cited references cannot be properly combined as suggested.

As discussed above, Sharma, et al. is directed to a low temperature, low pressure nanostructure formation process. Moreover, the teachings of Sharma, et al. suggest that the low temperature formation processes are preferred over high temperature processes. For example, at paragraph [0050], the reference teaches that the discussed low temperature methods allow easier integration with other techniques and materials. At paragraph [0051], the reference teaches additional advantages of low-temperature fabrication, in particular for semiconductor fiber formation in which the substrate and the fibers differ in composition. Accordingly, Applicants submit that Sharma, et al. teaches away from nanostructure formation processes that utilize high temperatures, and in particular, temperatures above those disclosed in the application, i.e., 550°C.

Majumdar, et al., is directed to nanostructures that can be formed according to a modified VLS procedure that includes dissolving gas reactants in nano-sized catalytic liquid followed by the growth of the desired nanostructures (paragraph [0090]). According to the reference, “[t]he CVD process is preferably carried out at approximately 600°C to approximately 800°C” (paragraph [0091], Example 1). The reference goes on in this paragraph to teach that at this temperature, the catalyst nanoclusters (in this particular example, the gold nanoclusters) form a liquid alloy with the gaseous reactant (e.g., silicon) and spontaneously break up into nanometer-sized droplets. Upon supersaturation of the catalyst droplets by the reactant, growth of the nanowire is initiated. The reference, therefore, teaches that the process should be carried out at the disclosed temperatures in order to form the nanometer-sized droplets and subsequent fibers.

Other examples in the application take place at even higher temperatures (Example 4, paragraph [144], 850°C to 950°C; Example 7, paragraph [204], 880°C to 905°C). Accordingly, the processes of Majumdar, et al. are carried out at higher temperatures than those of Sharma, et al.

Applicants submit that both references teach away from combination with the other. For instance, Sharma, et al. teaches that the disclosed low temperature processes are preferable to higher temperature processes, as discussed above. In addition, Sharma, et al. teaches that their technique is an improvement over VLS processes such as those of Mujumdar, et al. For example, Sharma, et al. discloses that their technique "does not require creation of quantum sized liquid metal droplets to synthesize nanowires. In addition, it offers advantages such as lower growth temperature, better control over size and size distribution, better control over the composition and purity of the nanowires" (Abstract). Accordingly, Applicants maintain that Sharma, et al. teaches away from a combination of their process with high temperature VLS processes requiring formation of quantum-sized droplets of materials such as is disclosed by Majumdar, et al.

In addition, Applicants submit that Majumdar, et al. also teaches away from such a combination. For example, according to Majumdar, et al., the disclosed high temperatures are necessary for the formation process to proceed, as discussed above, and as such, the teachings of this reference are directed away from lower temperature ranges and any combination with lower temperature processes such as that of Sharma, et al.

Applicants submit that the references teach away from the suggested combination, and there exists no proper motivation to combine the references as suggested. As such, Applicants further submit that pending claims 11-37 patentably define over the cited references and request allowance of the claims.

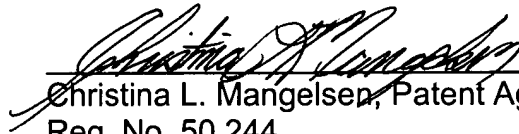
It is believed that the present application is in complete condition for allowance and favorable action, therefore, is respectfully requested. Examiner Fuller is invited and encouraged to telephone the undersigned, however, if any issues remain after consideration of this response.

Please charge any additional fees required by this Amendment to Deposit Account No. 04-1403.

Respectfully submitted,

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12/20/05
Date


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